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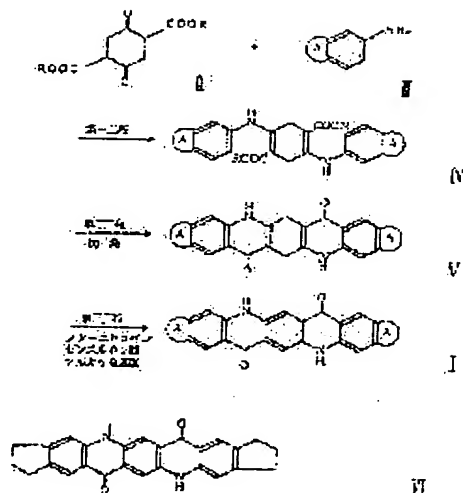
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(54) ALPHA-TYPE QUINACRIDONE DERIVATIVE AND PREPARATION THEREOF

(57)Abstract:

PURPOSE: To provide a new  $\alpha$ -type quinacridone derivative which is useful as a pigment having excellent hue of red color and brightness.

CONSTITUTION: A compound of formula I (A ring is cyclopentane ring, 1,3-dioxolane ring, indan ring or N-alkylindoline ring). E.g. A compound of formula VI. The preparation of the compound comprises the first stage for preparing a compound of formula IV by reacting a compound of formula II (R is a lower alkyl) with a compound of formula III, the second stage for preparing a compound of formula V by thermally reacting the compound of the formula IV, and the third stage for preparing the compound of the formula I by reacting the compound of the formula V with m-nitrobenzenesulfonic acid alkali metal salt.



## LEGAL STATUS

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the organic electroluminescence devices which are excellent in luminous efficiency and emit light in high brightness.

[Translation done.]

## \* NOTICES \*

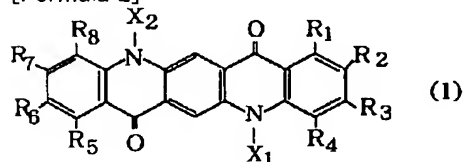
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## MEANS

[Means for Solving the Problem] this invention person etc. came to complete this invention, as a result of examining organic electroluminescence devices wholeheartedly. That is, this invention is the organic electroluminescence devices which come at least to pinch the layer containing at least one sort of compounds expressed with a general formula (1) and (\*\* 2) to inter-electrode [ of \*\* couple ] further, and [0006].

[Formula 2]



With the carbon atom which combined mutually at least 1 set chosen from R1, R2, R2 and R3, R3 and R4, R5 and R6, R6 and R7, and R7 and R8 of adjoining radicals among [type, and has been permuted The ring type aromatic series ring which is not permuted [ the ring type aliphatic series ring which is not permuted / a permutation or /, a permutation, or ], Or R1 -R8 which forms the heterocycle type aromatic series ring which is not permuted [ a permutation or ], and does not form a ring Hydrogen atom, Aryl group [ which is not permuted / a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ] or N, and N-JI permutation amino group is expressed. X1 And X2 The aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] is expressed. However, X1 And X2 A hydrogen atom is not expressed simultaneously. ]

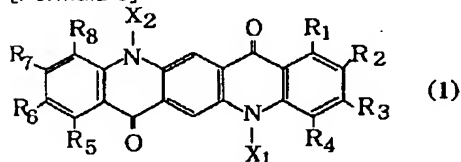
\*\* The organic electroluminescence devices given in \*\* the given layer containing the compound expressed with a general formula (1) is a luminous layer, \*\* The organic electroluminescence devices given in \*\* the given layer containing the compound expressed with a general formula (1) is an electron injection transporting bed, \*\* Organic electroluminescence devices given in either the aforementioned \*\* to which the layer containing the compound expressed with a general formula (1) is further characterized by containing a luminescent organometallic complex - \*\*, \*\* It is further related with inter-electrode [ of organic electroluminescence devices given in either the aforementioned \*\* which has a hole-injection transporting bed - \*\*, and \*\* couple ] at organic electroluminescence devices given in either the aforementioned \*\* which has an electron injection transporting bed - \*\* inter-electrode [ of a couple ].

[0007]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail. The organic electroluminescence devices of this invention come at least to pinch the layer containing at least one sort of compounds expressed with a general formula (1) and (\*\* 3) to inter-electrode [ of a couple ] further.

[0008]

[Formula 3]



With the carbon atom which combined mutually at least 1 set chosen from R1, R2, R2 and R3, R3 and R4, R5 and R6, R6 and R7, and R7 and R8 of adjoining radicals among [type, and has been permuted The ring type aromatic series ring which is not permuted [ the ring type aliphatic series ring which is not permuted / a permutation or /, a permutation, or ], Or R1 -R8 which forms the heterocycle type aromatic series ring which is not permuted [ a permutation or ], and does not form a ring Hydrogen atom, Aryl group [ which is not permuted / a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ] or N, and N-JI permutation amino group is expressed. X1 And X2 The aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] is expressed. However, X1 And X2 A hydrogen atom is not expressed simultaneously. ]

[0009] the compound expressed with a general formula (1) -- setting -- R1 R2 and R2 R3 and R3 R4 and R5 R6

and R6 R7 and R7 R8 At least 1 set chosen of adjoining radicals are combined mutually. from -- With the permuted carbon atom, the ring type aliphatic series ring which is not permuted [ a permutation or ], The heterocycle type aromatic series ring which is not permuted [ the ring type aromatic series ring which is not permuted / a permutation or /, a permutation, or ] is formed. Preferably R1 R2 and R2 R3 and R3 R4 and R5 R6 and R6 R7 and R7 R8 from -- at least 1-2 sets chosen of adjoining radicals With the carbon atom which combined each other and has been permuted, the heterocycle type aromatic series ring with 6-16 total carbon which is not permuted [ a ring type aromatic series ring with 6-10 total carbon which is not permuted / the ring type aliphatic series ring which is not permuted / a permutation with 5-10 total carbon or /, a permutation, or /, a permutation, or ] is formed.

[0010] As an example of a ring type aliphatic series ring, a ring type aromatic series ring, or a heterocycle type aromatic series ring, a cyclopentene ring, a cyclohexene ring, a cyclo heptene ring, a cyclooctane ring, the benzene ring, a naphthalene ring, the Indore ring, N-permutation Indore ring (for example, N-ethyl indole ring, a N-n-butyl indole ring, N-phenylindole ring), etc. can be mentioned, and they are a cyclohexene ring, the benzene ring, and N-permutation Indore ring more preferably, for example. In addition, the ring type aliphatic series ring, the ring type aromatic series ring, or the heterocycle type aromatic series ring may have the substituent. For example, R1 -R8 The quoted halogen atom, the straight chain of carbon numbers 1-16, Branching or an annular alkyl group, the straight chain of carbon numbers 1-16, branching, or an annular alkoxy group, or the aryl group which is not permuted [ the permutation of carbon numbers 4-16, or ] -- a single permutation -- or you may many permute and they are a non-permuted ring type aliphatic series ring, a non-permuted ring type aromatic series ring, or the nitrogen-containing heterocycle type aromatic series ring of N-permutation more preferably.

[0011] R1 -R8 which does not form a ring in the compound expressed with a general formula (1) Aryl group [ which is not permuted / a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching or an annular alkoxy group, a permutation, or ] or N, and N-JI permutation amino group is expressed. In addition, an aryl group expresses heterocycle type aromatic series radicals, such as ring type aromatic series radicals, for example, a furil radical, such as a phenyl group and a naphthyl group, a thienyl group, and a pyridyl radical. R1 -R8 which does not form the ring in the compound expressed with a general formula (1) As an example A hydrogen atom, a halogen atom (for example, a fluorine atom, a chlorine atom, a bromine atom), the straight chain of carbon numbers 1-16, branching, or an annular alkyl group (for example, a methyl group --) An ethyl group, n-propyl group, an isopropyl group, n-butyl, an isobutyl radical, sec-butyl, tert-butyl, n-pentyl radical, an isopentyl radical, A neopentyl radical, a tert-pentyl radical, a cyclopentyl group, n-hexyl group, 3 and 3-dimethyl butyl, a cyclohexyl radical, n-heptyl radical, a cyclohexyl methyl group, n-octyl radical, a tert-octyl radical, a 2-ethylhexyl radical, n-nonyl radical, n-decyl group, n-dodecyl, n-tetradecyl radical, n-hexadecyl radical, etc., the straight chain of carbon numbers 1-16, branching, or an annular alkoxy group (for example, a methoxy group --) An ethoxy radical, n-propoxy group, an isopropoxy group, an n-butoxy radical, An iso butoxy radical, a sec-butoxy radical, an n-pentyloxy radical, a neopentyl oxy-radical, Cyclopenthyloxy radical, n-hexyloxy radical, 3, and 3-dimethyl butyloxy radical, [0012], such as a cyclohexyloxy radical, n-heptyloxy radical, n-octyloxy radical, 2-ethylhexyloxy radical, n-nonyloxy radical, an n-decyloxy radical, n-dodecyloxy radical, n-tetradecyl oxy-radical, and n-hexadecyl oxy-radical Or the aryl group which is not permuted [ the permutation of carbon numbers 4-16, or ] for example, a phenyl group, 2-methylphenyl radical, and 3-methylphenyl radical -- 4-methylphenyl radical, 4-ethyl phenyl group, a 4-n-propyl phenyl group, 4-isopropyl phenyl group, a 4-n-buthylphenyl radical, a 4-tert-buthylphenyl radical, 4-isopentyl phenyl group, a 4-tert-pentyl phenyl group, A 4-n-hexyl phenyl group, 4-cyclohexyl phenyl group, a 4-n-octyl phenyl group, A 4-n-DESHIRU phenyl group, 2, 3-dimethylphenyl radical, 2, 4-dimethylphenyl radical, 2, 5-dimethylphenyl radical, 3, 4-dimethylphenyl radical, 5-indanyl radical, 1, 2, 3, a 4-tetrahydro-5-naphthyl group, 1, 2 and 3, a 4-tetrahydro-6-naphthyl group, 2-methoxyphenyl radical, 3-methoxyphenyl radical, 4-methoxyphenyl radical, A 3-ethoxy phenyl group, a 4-ethoxy phenyl group, a 4-n-propoxy phenyl group, 4-isopropoxy phenyl group, a 4-n-butoxy phenyl group, a 4-n-pentyloxy phenyl group, A 4-n-hexyloxy phenyl group, 4-cyclohexyloxy phenyl group, A 4-n-heptyloxy phenyl group, a 4-n-octyloxy phenyl group, A 4-n-decyloxy phenyl group, 2, 3-dimethoxy phenyl group, 2, 5-dimethoxy phenyl group, 3, 4-dimethoxy phenyl group, a 2-methoxy-5-methylphenyl radical, A 3-methyl-4-methoxyphenyl radical, 2-fluoro phenyl group, 3-fluoro phenyl group, 4-fluoro phenyl group, 2-chlorophenyl radical, a 3-chlorophenyl radical, 4-chlorophenyl radical, 4-BUROMO phenyl group, 4-trifluoro methylphenyl radical, a 3-chloro-4-methylphenyl radical, A 2-chloro-4-methoxyphenyl radical, 4-phenyl phenyl group, 3-phenyl phenyl group, 4-(4'-methylphenyl) phenyl group, 4-(4'-methoxyphenyl) phenyl group, [0013], such as 1-naphthyl group, 2-naphthyl group, a 4-ethoxy-1-naphthyl group, a 6-methoxy-2-naphthyl group, a 7-ethoxy-2-naphthyl group, 2-furil radical, 2-thienyl group, 3-thienyl group, 2-pyridyl radical, 3-pyridyl radical, and 4-pyridyl radical carbon numbers 2-16N and N-JI permutation amino group (for example, N and N-dimethylamino radical --) An N and N-diethylamino radical, N, and N-G n-butylamino radical, N, and N-G n-hexylamino radical, N, such as an N-methyl-N-n-butylamino radical, N-dialkyl permutation amino group, An N-methyl-N-phenylamino radical, an N-ethyl-N-phenylamino radical, N-alkyl-N-phenyl permutation amino groups, such as a N-n-propyl-N-phenylamino radical and a N-n-butyl-N-phenylamino radical, They are N, such as N and N-diphenylamino radical and an N-phenyl-N-(4-methylphenyl) amino group, an N-diaryl permutation amino group, etc. more preferably A hydrogen atom, a fluorine atom, a chlorine atom, the alkyl group of carbon numbers 1-10, the alkoxy group of carbon numbers 1-10, It is the aryl group of carbon numbers 6-10 or carbon numbers 6-16N, and N-JI permutation amino group, and they are a hydrogen atom, a fluorine atom, a chlorine atom, the alkyl group of

carbon numbers 1-6, the alkoxy group of carbon numbers 1-6 or carbon numbers 7-16N, and N-JI permutation amino group still more preferably. R1 -R8 which does not form the ring especially It is desirable that it is a hydrogen atom.

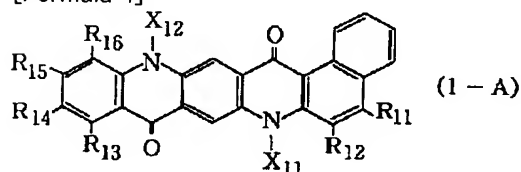
[0014] It sets to the compound expressed with a general formula (1), and is X1. And X2 The aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ] is expressed. However, X1 And X2 A hydrogen atom is not expressed simultaneously. Preferably A hydrogen atom, the straight chain of carbon numbers 1-16, branching, or an annular alkyl group, They are a ring type aromatic series radical with 6-16 total carbon, a heterocycle type aromatic series radical with 4-16 total carbon, or an aralkyl radical with 7-16 total carbon. More preferably A hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, They are a heterocycle type aromatic series radical with 4-10 total carbon, or an aralkyl radical with 7-10 total carbon. Still more preferably They are a hydrogen atom, the straight chain of carbon numbers 1-10, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon.

[0015] X1 And X2 As an example of the aryl group which is not permuted [ a straight chain, branching or an annular alkyl group, a permutation, or ], it is R1 -R8, for example. The aryl group which is not permuted [ branching mentioned as an example or an annular alkyl group, a permutation, or ] can be illustrated. Moreover, X1 And X2 As an example of the aralkyl radical which is not permuted [ a permutation or ] For example, benzyl, phenethyl radical, alpha-methylbenzyl radical, alpha, and alpha-dimethylbenzyl radical, 1-naphthyl methyl group, 2-naphthyl methyl group, a furfuryl radical, 2-methylbenzyl radical, 3-methylbenzyl radical, 4-methylbenzyl radical, 4-ethyl benzyl, 4-isopropyl benzyl, 4-tert-butyl benzyl, 4-n-hexyl benzyl, 3, 4-dimethylbenzyl radical, 3-methoxybenzyl radical, 4-methoxybenzyl radical, Although 4-ethoxybenzyl radical, 4-n-butoxy benzyl, 4-fluoro benzyl, 3-fluoro benzyl, 2-chloro benzyl, 4-chloro benzyl, etc. can be mentioned, it is not limited to these.

[0016] As a compound expressed with the general formula (1) concerning this invention, the compound expressed with a general formula (1-A) - a general formula (1-G) (\*\* 4 --izing 10) can be mentioned as a more desirable compound.

[0017]

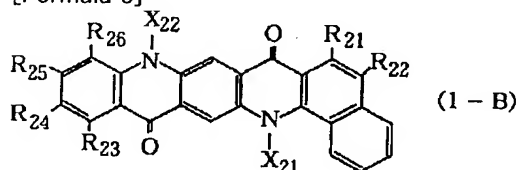
[Formula 4]



R11-R16 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X11 and X12 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ]. However, X11 and X12 do not express a hydrogen atom simultaneously. ]

[0018]

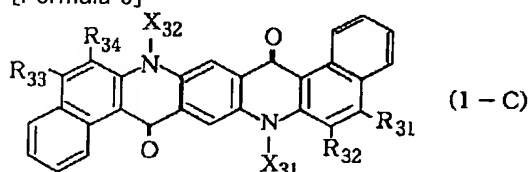
[Formula 5]



R21-R26 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X21 and X22 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ]. However, X21 and X22 do not express a hydrogen atom simultaneously. ]

[0019]

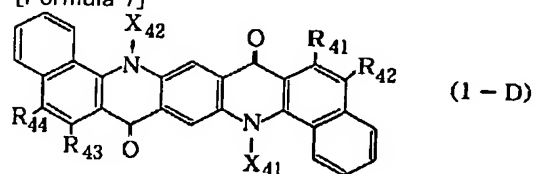
[Formula 6]



R31-R34 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X31 and X32 express the aralkyl radical which is not permuted [ the aryl group which is

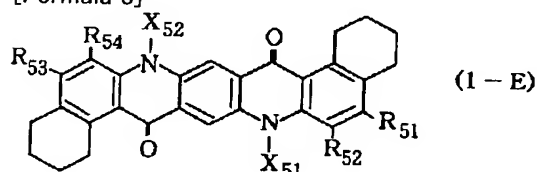
not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or ]. However, X31 and X32 do not express a hydrogen atom simultaneously. ]

[0020]  
[Formula 7]



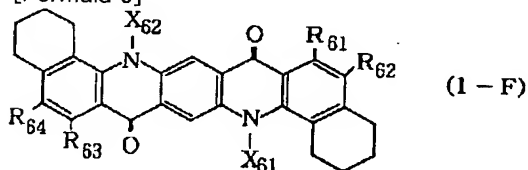
R41-R44 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X41 and X42 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ]. However, X41 and X42 do not express a hydrogen atom simultaneously. ]

[0021]  
[Formula 8]



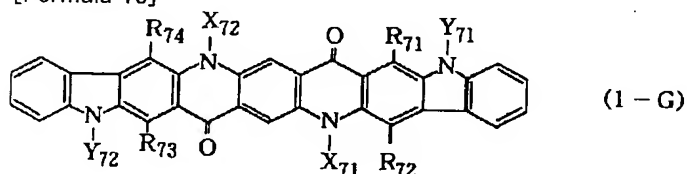
R51-R54 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X51 and X52 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ]. However, X51 and X52 do not express a hydrogen atom simultaneously. ]

[0022]  
[Formula 9]



R61-R64 express among [type the aryl group which is not permuted [ a hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group a straight chain, branching, an annular alkoxy group, a permutation, or ], and X61 and X62 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ]. However, X61 and X62 do not express a hydrogen atom simultaneously. ]

[0023]  
[Formula 10]



R71-R74 among [type A hydrogen atom, a halogen atom, a straight chain, branching, or an annular alkyl group, The aryl group which is not permuted [ a straight chain, branching, an annular alkoxy group, a permutation, or ] is expressed. X71 and X72 express the aralkyl radical which is not permuted [ the aryl group which is not permuted / a hydrogen atom, a straight chain, branching or an annular alkyl group, a permutation, or /, a permutation, or ], and Y71 and Y72 express the aryl group which is not permuted [ a straight chain, branching, an annular alkyl group, a permutation, or ]. However, X71 and X72 do not express a hydrogen atom simultaneously. ]

[0024] In the compound expressed with a general formula (1-A), R11-R16 are hydrogen atoms more preferably. X11 and X12 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0025] In the compound expressed with a general formula (1-B), R21-R26 are hydrogen atoms more preferably. X21 and X22 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group,

a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0026] In the compound expressed with a general formula (1-C), R31-R34 are hydrogen atoms more preferably. X31 and X32 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0027] In the compound expressed with a general formula (1-D), R41-R44 are hydrogen atoms more preferably. X41 and X42 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0028] In the compound expressed with a general formula (1-E), R51-R54 are hydrogen atoms more preferably. X51 and X52 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0029] In the compound expressed with a general formula (1-F), R61-R64 are hydrogen atoms more preferably. X61 and X62 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably.

[0030] In the compound expressed with a general formula (1-G), R71-R74 are hydrogen atoms more preferably. X71 and X72 are a hydrogen atom, the straight chain of carbon numbers 1-6, branching or an annular alkyl group, a ring type aromatic series radical with 6-10 total carbon, or an aralkyl radical with 7-10 total carbon more preferably. More preferably, it is the straight chain of carbon numbers 1-8, branching or an annular alkyl group, and a ring type aromatic series radical with 6-10 total carbon, and still more preferably, Y71 and Y72 are the straight chain of carbon numbers 1-8 or the alkyl group of branching, and a ring type aromatic series radical with 6-10 total carbon, and are the straight chain of carbon numbers 1-8, or the alkyl group of branching especially preferably.

[0031] In the organic electroluminescence devices of this invention, it sets to a general formula (1), and is R1. R2, R2 R3 and R3 R4 and R5 R6 and R6 R7 and R7 R8 from -- at least 1 set chosen of adjoining radicals with the carbon atom which combined each other and has been permuted The ring type aromatic series ring which is not permuted [ the ring type aliphatic series ring which is not permuted / a permutation or /, a permutation, or ], Or the heterocycle type aromatic series ring which is not permuted [ a permutation or ] is formed, and it is X1. And X2 It is the big description to use at least one sort of compounds which do not express a hydrogen atom simultaneously, and it becomes possible [ offering the organic electroluminescence devices which emit light in high brightness by this ]. Although a reason is not certain, according to the effectiveness of the substituent, the state of aggregation of the Quinacridone derivative can change and, thereby, non-permuted Quinacridone and its derivative (for example, 5, 12-dimethyl Quinacridone), and the Quinacridone derivative expressed with the general formula (1) concerning this invention can be conjectured to be because [ that electrical characteristics etc. change ] physical.

[0032] As an example of a compound expressed with the general formula (1) concerning this invention, although the following compounds can be mentioned, this invention is not limited to these, for example. In addition, naming of a compound expressed with a general formula (1) followed the approach given in for example, Chem.Rev., 67, and 1 (1967).

- Instantiation compound Number

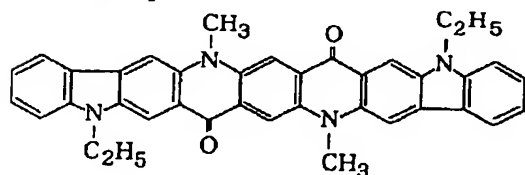
1. 5-Methyl-1:2-Benzo Quinacridone 2. 5, 12-dimethyl-1:2-benzo Quinacridone 3. 5 and 12-diethyl-9-chloro-1:2-benzo Quinacridone 4. 5, 12-dimethyl-3:4-benzo Quinacridone 5. 5 and 12-di-n-butyl-3:4-benzo Quinacridone 6. The 5-methyl -1:2 and 8:9-dibenzo Quinacridone 7. 5, the 12-dimethyl -1:2, and 8:9-dibenzo Quinacridone 8. 5-methyl-12-ethyl -1:2 and 8:9-dibenzo Quinacridone 9. 5, the 12-diethyl -1:2, and 8:9-dibenzo Quinacridone 10. 5, the 12-diisopropyl -1:2, and 8:9-dibenzo Quinacridone 11. 5, 12-di-n-butyl -1:2, and 8:9-dibenzo Quinacridone 12. 5, the 12-G n-pentyl -3, 10-diphenyl -1:2, 8: 9-dibenzo Quinacridone 13. 5, the 12-G n-hexyl -1:2, 8:9-dibenzo chinae-cortex KURIDO N 14. The 5-phenyl -1:2 and 8:9-dibenzo Quinacridone 15. 5, 12-diphenyl -1:2, and 8:9-dibenzo Quinacridone 16. 5, the 12-dibenzyl -1:2, and 8:9-dibenzo Quinacridone 17. 5, the 12-dimethyl -2:3, and 9:10-dibenzo Quinacridone 18. 5, the 12-dimethyl -3:4, and 10:11-dibenzo Quinacridone 19. 5, the 12-diethyl -3:4, and 10:11-dibenzo Quinacridone 20. 5, the 12-G n-propyl -3:4, 10:11-dibenzo KINAKU RIDON 21. 5, 12-diisobutyl - 3:4, 10:11-dibenzo chinae-cortex KURIDO N 22. 5, the 12-G n-octyl -3:4, 10:11-dibenzo KINAKU RIDON 23. 5, the 12-G n-dodecyl -3:4, 10:11-dibenzo KINAKU RIDON 24. 5, 12-diphenyl -3:4, 10:11-dibenzo Quinacridone 25. 5, 12-JI (4'-methylphenyl) -3:4, 10:11-JIBE NZOKINA chestnut boss 26. The 5-benzyl -3:4, 10:11-dibenzo Quinacridone 27. 5, the 12-dibenzyl -3:4, 10:11-dibenzo Quinacridone 28. 5, 12-JI (4'-methylbenzyl) -3:4, 10:11-JIBE NZOKINA chestnut boss 29. 5, the 12-dimethyl -1:2, 8:9-JINAFUTO Quinacridone 30. 5, the 12-diethyl -3:4, 10:11-JINAFUTO Quinacridone [0033] 31. 5, 12-Dimethyl -1:2, 8:9-Screw (Tetramethylen) Chinae Cortex Chestnut boss 32. 5, the 12-diethyl -1:2, a 8:9-screw (tetramethylen) chinae cortex Chestnut boss 33. 5, 12-diphenyl -1:2, 8:9-screw (tetramethylen) KI NAKURIDON 34. 5, the 12-dimethyl -3:4, 10:11-screw (trimethylene) KI NAKURIDON 35. 5, 12-dicyclohexyl -3:4, 10:11-screw (TORIMECHI Wren) Quinacridone 36. 5, the 12-dibenzyl -3:4, 10:11-screw (trimethylene) Quinacridone 37. 5, the 12-dimethyl -3:4, 10:11-screw (tetramethylen) Quinacridone 38. 5, the 12-diethyl -3:4, 10:11-screw (tetramethylen)

Quinacridone 39. 5, 12-di-n-butyl -3:4, 10:11-screw () [ TETORAMECHI ] Wren Quinacridone 40. 5, 12-diphenyl -3:4, 10:11-screw () [ tetramethylen ] Quinacridone 41. 5, the 12-dibenzyl -3:4, 10:11-screw () [ tetramethylen ] Quinacridone 42. 5, the 12-diethyl -1:2, 8:9-screw (pentamethylene) chinae cortex Chestnut boss 43. 5, the 12-dimethyl -3:4, 10:11-screw (hexamethylene)  
 Quinacridone [0034] Furthermore, the following type (44) - a formula (47) (\*\* 11 --izing 14)

44.

[0035]

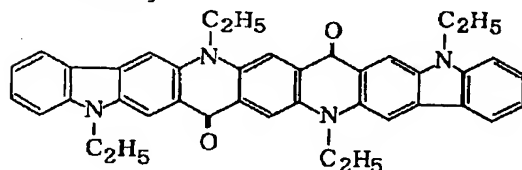
[Formula 11]



45.

[0036]

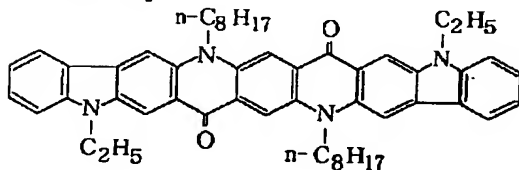
[Formula 12]



46.

[0037]

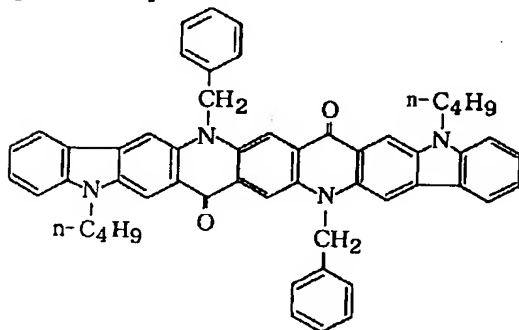
[Formula 13]



47.

[0038]

[Formula 14]



[0039] The compound expressed with the general formula (1) concerning this invention can be itself manufactured according to a well-known approach. For example, according to the approach of a publication, it can manufacture in the reference quoted by Chem.Rev., 67, 1, and (1967) its total theory as a total theory. Namely, for example, the sodium of 2 and 5-JI (ANIRINO permutation which has the condensed ring) terephthalic-acid derivative After manufacturing the Quinacridone derivative heating and by carrying out a ring closure under existence of polyphosphoric acid, Under existence of a base (for example, sodium hydride, a sodium METOKI side, potassium-tert-butoxide, potassium carbonate, a sodium hydroxide) X1 A-izing agent and/or X2 It can manufacture by making a-izing agent (for example, [the halogenide of X1 and/or the halogenide of X2]) act.

[0040] Organic electroluminescence devices usually come at least to pinch the luminous layer which contains at least one sort of luminescence components in inter-electrode [ of a couple ] further. In consideration of each functional level of the hole injection of the compound used for a luminous layer and electron hole transport, electron injection, and electronic transport, the electron injection transporting bed containing the hole-injection transporting bed and/or electron injection transport component containing a hole-injection transport component can also be prepared according to a request. For example, when the hole-injection function of the compound



used for a luminous layer, an electron hole transport function and/or an electron injection function, and an electronic transport function are good, a luminous layer can consider as the configuration of the component of the mold which served both as the hole-injection transporting bed and/or the electron injection transporting bed. Of course, it can also consider as the configuration of the component (much more component of a mold) of the mold which does not prepare the layer of both a hole-injection transporting bed and an electron injection transporting bed depending on the case. Moreover, each layer of a hole-injection transporting bed, an electron injection transporting bed, and a luminous layer may be structure much more, or may be multilayer structure, and in each layer, a hole-injection transporting bed and an electron injection transporting bed can prepare independently the layer which has an impregnation function, and the layer which has a transport function, and can also constitute it.

[0041] In the organic electroluminescence devices of this invention, as for the compound expressed with a general formula (1), it is desirable to use for a hole-injection transport component, a luminescence component, or an electron injection transport component, and it is more desirable to use for a luminescence component or an electron injection transport component. In the organic electroluminescence devices of this invention, the compound expressed with a general formula (1) may be used independently, or may be used together. [ two or more ]

[0042] Especially as a configuration of the organic electroluminescence devices of this invention, it cannot limit and (A) anode plate / hole-injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component ( drawing 1 ), (B) anode plate / hole-injection transporting bed / luminous layer / cathode mold component ( drawing 2 ), (C) anode plate / luminous layer / electron injection transporting bed / cathode mold component ( drawing 3 ), (D) anode plate / luminous layer / cathode mold component ( drawing 4 ), etc. can be mentioned. Furthermore, it can also consider as (E) anode plate / hole-injection transporting bed / electron injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component ( drawing 5 ) which is a component of the mold which put the luminous layer by the electron injection transporting bed. (D) Although the component of the mold which made inter-electrode [ of a couple ] pinch a luminescence component with a gestalt further is natural as a component configuration of a mold Furthermore, for example, the component of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed (F) hole-injection transport component, the luminescence component, and the electron injection transport component ( drawing 6 ), (G) There is a component ( drawing 8 ) of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed the component ( drawing 7 ) or (H) luminescence component, and the electron injection transport component of the mold which it made inter-electrode [ of a couple ] pinch with the one-layer gestalt which mixed the hole-injection transport component and the luminescence component.

[0043] The organic electroluminescence devices of this invention cannot be restricted to these component configurations, and can prepare a hole-injection transporting bed, a luminous layer, and a two or more layers electron injection transporting bed in each type of component. Moreover, in each type of component, the mixing layer of a luminescence component and an electron injection transport component can also be prepared between a hole-injection transporting bed and a luminous layer between the mixing layer of a hole-injection transport component and a luminescence component and/or a luminous layer, and an electron injection transporting bed. The configuration of more desirable organic electroluminescence devices is (A) mold component, (B) mold component, (C) mold component, (E) mold component, (F) mold component, (G) mold component, or (H) mold component, and is (A) mold component, (B) mold component, (C) mold component, (F) mold component, or (H) mold component still more preferably.

[0044] As organic electroluminescence devices of this invention, (A) anode plate / hole-injection transporting bed / luminous layer / electron injection transporting bed / cathode mold component shown in ( drawing 1 ) are explained, for example. ( drawing 1 ) -- setting -- 1 -- a substrate and 2 -- in an anode plate and 3, an electron injection transporting bed and 6 show cathode, and, as for a hole-injection transporting bed and 4, 7 shows a power source, as for a luminous layer and 5.

[0045] Being supported by the substrate 1 is desirable, especially as a substrate, although the organic electroluminescence devices of this invention are not limited, transparence thru/or a translucent thing are desirable [ electroluminescence devices ], for example, they can mention what consists of a compound sheet which combined a glass plate, a transparence plastic sheet (for example, sheets, such as polyester, a polycarbonate, polysulfone, polymethylmethacrylate, polypropylene, and polyethylene), a translucent plastic sheet, a quartz, transparent ceramics, or these. Furthermore, the luminescent color is also controllable to a substrate combining for example, the light filter film, the color conversion film, and the dielectric reflective film.

[0046] As an anode plate 2, it is desirable to use a metal with a comparatively large work function, an alloy, or an electric conductivity compound as electrode material. As electrode material used for an anode plate, gold, platinum, silver, copper, cobalt, nickel, palladium, vanadium, a tungsten, tin oxide, a zinc oxide, ITO (indium Tin oxide), the poly thiophene, polypyrrole, etc. can be mentioned, for example. Such electrode material may be used independently or may be used together. [ two or more ] An anode plate can form such electrode material on a substrate by approaches, such as vacuum deposition and the sputtering method. Moreover, an anode plate may be structure much more, or may be multilayer structure. The sheet electric resistance of an anode plate is more preferably set as 5-50ohms / \*\* extent below hundreds of ohms / \*\*. Although the thickness of an anode plate is based also on the ingredient of the electrode material to be used, generally it is more preferably set as about 10-500nm about 5-1000nm.

[0047] The hole-injection transporting bed 3 is a layer containing the compound which has the function to convey the electron hole which makes easy impregnation of the electron hole (hole) from an anode plate, and which was functioned and poured in. At least one sort of hole-injection transporting beds can be formed using the compounds (for example, a phthalocyanine derivative, a thoria reel methane derivative, a thoria reel amine derivative, an oxazole derivative, a hydrazone derivative, a stilbene derivative, a pyrazoline derivative, a polysilane derivative, polyphenylene vinylene and its derivative, the poly thiophene and its derivative, a Polly N-vinylcarbazole derivative, etc.) which have the compound and/or other hole-injection transport functions in which it is expressed with a general formula (1). In addition, the compound which has a hole-injection transport function may be used independently, or may be used together. [ two or more ]

[0048] As a compound which has other hole-injection transport functions to use in this invention a thoria reel amine derivative (for example, 4 and 4' screw [ - ] [N-phenyl-N-(4"-methylphenyl) amino] biphenyl -- 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl, 4 and 4' screw [ - ] [N-phenyl-N-(3"-methoxyphenyl) amino] biphenyl, 4 and 4' screw [ - ] [N-phenyl-N-(1"-naphthyl) amino] biphenyl, 3 and 3' -- the - dimethyl - 4 and 4' - screw [N-phenyl-N-(3"-methylphenyl) amino] biphenyl -- 1 and 1-screw [4'-[N and N-JI (4"-methylphenyl) amino] phenyl] cyclohexane, 9, 10-screw [N-(4'-methylphenyl)-N-(4"-n-buthylphenyl) amino] phenanthrene, 3, 8-screw (N and N-diphenylamino)-6-phenyl phenanthridine, four - methyl - N -- N - a screw - - [ -- four -- " -- four -- " -- ' - a screw -- [ -- N -- ' -- N -- ' - JI (4-methylphenyl) -- amino -- ] -- a biphenyl - four - IRU -- ] -- an aniline -- N, N'-screw [4-(diphenylamino) phenyl]-N, N'-diphenyl -1, 3-diaminobenzene, N, N'-screw [4-(diphenylamino) phenyl]-N, N'-diphenyl -1, 4-diaminobenzene, 5 and 5' -- screw [4-(screw [4-methylphenyl] amino) phenyl]-2, 2':5', 2"-TACHIOFEN, 1, 3, 5-tris (diphenylamino) benzene, 4, 4', a 4"-tris (N-carbazolyl) triphenylamine, 4, 4', a 4"-tris [N-(3"-methylphenyl)-N-phenylamino] triphenylamine, The poly thiophene and its derivatives, such as 1, 3, and 5-tris [N-(4'-diphenyl aminophenyl) phenylamino] benzene, and a Polly N-vinylcarbazole derivative are more desirable. When using together the compound expressed with a general formula (1), and the compound which has other hole-injection transport functions, the rate of a compound of being expressed with the general formula (1) occupied in a hole-injection transporting bed is preferably prepared to about 0.1 - 40% of the weight.

[0049] A luminous layer 4 is a layer containing the compound which has an electron hole and electronic impregnation functions, those transport functions, and the function to make recombination of an electron hole and an electron generate an exciton. the fluorescence compound (for example, an acridone derivative, the Quinacridone derivative, and a polynuclear aromatic compound -- [ -- for example] which has the compound and/or other luminescence functions in which a luminous layer is expressed with a general formula (1) Rubrene, an anthracene, tetracene, a pyrene, perylene, a chrysene, Deca cyclene, coronene, a tetra-phenyl cyclopentadiene, a PENTA phenyl cyclopentadiene, 9, 10-diphenyl anthracene, 9, 10-screw (phenyl ethynyl) anthracene, 1, 4-screw (9'-ethynyl anthracenyl) benzene, 4, and 4'-screw (9"-ethynyl anthracenyl) biphenyl] and a thoria reel amine derivative -- [ -- for example ] which can mention the compound mentioned above as a compound which has a hole-injection transport function, and an organometallic complex -- [ -- for example Tris (8-quinolate) aluminum, screw (10-benzo [h] quinolate) beryllium, the zinc salt of 2-(2'-hydroxyphenyl) benzo oxazole, the zinc salt of 2-(2'-hydroxyphenyl) benzothiazole, zinc salt [ of a 4-hydroxy acridine ]], and a stilbene derivative -- [ -- for example 1, 1, 4, and 4-tetra-phenyl-1,3-butadiene, 4, and 4'-screw (2 and 2-diphenyl vinyl) biphenyl] and a coumarin derivative -- [ -- for example

## \* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## EXAMPLE

[Example] Hereafter, although an example explains this invention to a detail further, of course, this invention is not limited to these.

[0068] The glass substrate which has an ITO transparent electrode (anode plate) with an example 1 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporation equipment, the vacuum evaporation tub was decompressed to 3x10<sup>-6</sup>Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3''-methylphenyl) amino] biphenyl on an ITO transparent electrode Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, a source of vacuum evaporation which is different on it in tris (8-quinolate) aluminum, and 5 and 12-dimethyl-1:2-benzo Quinacridone (compound of the instantiation compound number 2) to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:0.5) was carried out to the thickness of 50nm, and it considered as the luminous layer which served as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 55 mA/cm<sup>2</sup>. The current flowed. Brightness 2360 cd/m<sup>2</sup> Green luminescence was checked.

[0069] It is the compound (example 2) of the instantiation compound number 4 instead of using the compound of the instantiation compound number 2 on the occasion of formation of a luminous layer in two to example 12 example 1. The compound (example 3) of the instantiation compound number 6, the compound of the instantiation compound number 9 (example 4), The compound (example 5) of the instantiation compound number 14, the compound of the instantiation compound number 16 (example 6), The compound (example 7) of the instantiation compound number 19, the compound of the instantiation compound number 27 (example 8), Organic electroluminescence devices were produced by the approach of a publication in the example 1 except having used the compound (example 9) of the instantiation compound number 31, the compound (example 10) of the instantiation compound number 37, the compound (example 11) of the instantiation compound number 40, and the compound (example 12) of the instantiation compound number 44. Green luminescence was checked when the direct current voltage of 12V was impressed to each component under the desiccation ambient atmosphere. Furthermore the property was investigated and the result was shown in the 1st table (table 1).

[0070] On the occasion of formation of a luminous layer, without using the compound of the instantiation compound number 2, only using tris (8-quinolate) aluminum, it vapor-deposited in thickness of 50nm, and organic electroluminescence devices were produced by the approach of a publication in the example 1 in example of comparison 1 example 1 except having considered as the luminous layer. Green luminescence was checked when the direct current voltage of 12V was impressed to this component under the desiccation ambient atmosphere. Furthermore the property was investigated and the result was shown in the 1st table (table 1).

[0071] In example of comparison 2 example 1, organic electroluminescence devices were produced by the approach of a publication in the example 1 except having used Quinacridone instead of using the compound of the instantiation compound number 2 on the occasion of formation of a luminous layer. Green luminescence was checked when the direct current voltage of 12V was impressed to this component under the desiccation ambient atmosphere. Furthermore the property was investigated and the result was shown in the 1st table (table 1).

[0072] In example of comparison 3 example 1, organic electroluminescence devices were produced by the approach of a publication in the example 1 except having used 5 and 12-dimethyl Quinacridone instead of using the compound of the instantiation compound number 2 on the occasion of formation of a luminous layer. Green luminescence was checked when the direct current voltage of 12V was impressed to this component under the desiccation ambient atmosphere. Furthermore the property was investigated and the result was shown in the 1st table (table 1).

[0073]

[A table 1]

第1表

有機電界 発光素子	輝度 ( $\text{cd}/\text{m}^2$ )	電流密度 ( $\text{mA}/\text{cm}^2$ )
実施例 2	2 3 6 0	5 5
実施例 3	2 3 4 0	5 4
実施例 4	2 3 3 0	5 3
実施例 5	2 3 6 0	5 6
実施例 6	2 3 8 0	5 7
実施例 7	2 3 5 0	5 5
実施例 8	2 3 4 0	5 6
実施例 9	2 3 2 0	5 7
実施例 1 0	2 3 5 0	5 5
実施例 1 1	2 3 3 0	5 6
実施例 1 2	2 3 4 0	5 4
比較例 1	1 1 7 0	8 2
比較例 2	1 5 5 0	7 4
比較例 3	1 6 5 0	5 7

[0074] The glass substrate which has an ITO transparent electrode (anode plate) with an example 13 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporationo equipment, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$  Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl on an ITO transparent electrode Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, a source of vacuum evaporationo which is different in the compound of tris (8-quinolate) aluminum and the instantiation compound number 7 on it to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:1.0) was carried out to the thickness of 50nm, and it considered as the luminous layer which served as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporationo was carried out, with the reduced pressure condition of a vacuum evaporationo tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 58 mA/cm<sup>2</sup>. The current flowed. Brightness 2350 cd/m<sup>2</sup> Green luminescence was checked.

[0075] The glass substrate which has an ITO transparent electrode (anode plate) with an example 14 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporationo equipment, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$  Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl to an ITO transparent electrode Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, a source of vacuum evaporationo which is different in the compound of tris (8-quinolate) aluminum and the instantiation compound number 18 on it to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:2.0) was carried out to the thickness of 50nm, and it considered as the luminous layer which served as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporationo was carried out, with the reduced pressure condition of a vacuum evaporationo tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 57 mA/cm<sup>2</sup>. The current flowed. Brightness 2240 cd/m<sup>2</sup> Green luminescence was checked.

[0076] The glass substrate which has an ITO transparent electrode (anode plate) with an example 15 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporationo equipment, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$  Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl on an ITO transparent electrode Evaporation

rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, a source of vacuum evaporation which is different on it in the compound of screw (2, 4-dimethyl-8-quinolate) aluminum-mu-oxo--screw (2, 4-dimethyl-8-quinolate) aluminum and the instantiation compound number 33 to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:4.0) was carried out to the thickness of 50nm, and it considered as the luminous layer. Next, it is tris (8-quinolate) aluminum Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 50nm, and considered as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 60 mA/cm<sup>2</sup>. The current flowed. Brightness 2180 cd/m<sup>2</sup> Green luminescence was checked.

[0077] The glass substrate which has an ITO transparent electrode (anode plate) with an example 16 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporation equipment, the vacuum evaporation tub was decompressed to 3x10<sup>-6</sup>Torr. First, they are 4, 4', and a 4"-tris [N-(3"-methylphenyl)-N-phenylamino] triphenylamine on an ITO transparent electrode Evaporation rate 0.1 nm/sec It vapor-deposited in thickness of 30nm, and considered as the first hole-injection transporting bed. Subsequently, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl on it Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 45nm, and considered as the second hole-injection transporting bed. Subsequently, a source of vacuum evaporation which is different in the compound of tris (8-quinolate) aluminum and the instantiation compound number 24 on it to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:1.0) was carried out to the thickness of 50nm, and it considered as the luminous layer. Furthermore on it, it is tris (8-quinolate) aluminum Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 50nm, and considered as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 58 mA/cm<sup>2</sup>. The current flowed. Brightness 2840 cd/m<sup>2</sup> Green luminescence was checked.

[0078] The glass substrate which has an ITO transparent electrode (anode plate) with an example 17 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporation equipment, the vacuum evaporation tub was decompressed to 3x10<sup>-6</sup>Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl on an ITO transparent electrode Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, it is 1, 1, 4, and 4-tetra-phenyl-1,3-butadiene on it Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 50nm, and considered as the luminous layer. Subsequently, a source of vacuum evaporation which is different in the compound of tris (8-quinolate) aluminum and the instantiation compound number 25 on it to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:4.0) was carried out to the thickness of 50nm, and it considered as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. When the direct current voltage of 14V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 52 mA/cm<sup>2</sup>. The current flowed. Brightness 1970 cd/m<sup>2</sup> Blue luminescence was checked.

[0079] The glass substrate which has an ITO transparent electrode (anode plate) with an example 18 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. After drying the substrate using nitrogen gas, carrying out UV / ozone washing further and fixing to the substrate electrode holder of vacuum evaporation equipment, the vacuum evaporation tub was decompressed to 3x10<sup>-6</sup>Torr. First, it is 4 and 4' screw [ - ] [N-phenyl-N-(3"-methylphenyl) amino] biphenyl on an ITO transparent electrode Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 75nm, and considered as the hole-injection transporting bed. Subsequently, a source of vacuum evaporation which is different in the compound of tris (8-quinolate) aluminum and the instantiation compound number 18 on it to evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 100:1.0) was carried out to the thickness of 50nm, and it considered as the luminous layer. subsequently, a it top -- 1 and 3-screw [5'-(p-tert-buthylphenyl)- 1, 3, and 4-OKISA diazole-2' - IRU] benzene -- evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 50nm, and considered as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporation was carried out, with the reduced pressure condition of a vacuum evaporation tub maintained. When the direct current voltage of 14V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 48 mA/cm<sup>2</sup>. The current flowed. Brightness 1840 cd/m<sup>2</sup> Green luminescence was checked.

[0080] The glass substrate which has an ITO transparent electrode (anode plate) with an example 19 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. The substrate was dried using nitrogen gas and UV / ozone washing was carried out further. Next, it is Polly N-vinylcarbazole (weight average molecular weight 150000) on an ITO transparent electrode, 1, 1, 4, and 4-tetra-phenyl-1,3-butadiene (blue luminescence component), The compound of the instantiation compound number 12, and DCM1 [a 4-(dicyanomethylene)-2-methyl-6-(4'-dimethylaminostyryl)-4H-pyran (orange luminescence component)] The luminous layer with a thickness of 400nm was formed with the dip coating method using the 3-% of the weight dichloroethane solution contained at a rate of the weight ratio 100:5:3:2, respectively. Next, after fixing to the substrate electrode holder of vacuum evaporationo equipment the glass substrate which has this luminous layer, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$ Torr. furthermore, a luminous layer top -- 3-(4'-tert-butylphenyl)-4-phenyl -- 5-(4''-biphenyl)- 1, 2, and 4-triazole -- evaporation rate 0.2 nm/sec after vapor-depositing in thickness of 20nm -- further -- a it top -- tris (8-quinolate) aluminum -- evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 30nm, and considered as the electron injection transporting bed. Furthermore on it, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. In addition, vacuum evaporationo was carried out, with the reduced pressure condition of a vacuum evaporationo tub maintained. When the direct current voltage of 12V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 74 mA/cm<sup>2</sup>. The current flowed. Brightness 1420 cd/m<sup>2</sup> White luminescence was checked.

[0081] The glass substrate which has an ITO transparent electrode (anode plate) with an example 20 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. The substrate was dried using nitrogen gas and UV / ozone washing was carried out further. next, an ITO transparent electrode top -- Polly N-vinylcarbazole (weight average molecular weight 150000), 1, and 3-screw [5'-(p-tert-butylphenyl)- 1, 3, and 4-OKISA diazole-2' -- the luminous layer with a thickness of 300nm was formed with the dip coating method using the 3-% of the weight dichloroethane solution which contains the compound of - IRU] benzene and the instantiation compound number 22 at a rate of the weight ratio 100:30:1, respectively. Next, after fixing to the substrate electrode holder of vacuum evaporationo equipment the glass substrate which has this luminous layer, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$ Torr. Furthermore, they are magnesium and silver on a luminous layer Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. When the direct current voltage of 15V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 76 mA/cm<sup>2</sup>. The current flowed. Brightness 1380 cd/m<sup>2</sup> Green luminescence was checked.

[0082] In example of comparison 4 example 20, organic electroluminescence devices were produced by the approach of a publication in the example 20 instead of the compound of the instantiation compound number 22 on the occasion of formation of a luminous layer except having used Quinacridone. When the direct current voltage of 15V was impressed to the produced organic electric-field component under the desiccation ambient atmosphere, it is 86 mA/cm<sup>2</sup>. The current flowed. Brightness 680 cd/m<sup>2</sup> Green luminescence was checked.

[0083] The glass substrate which has an ITO transparent electrode (anode plate) with an example 21 thickness of 200nm was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. The substrate was dried using nitrogen gas and UV / ozone washing was carried out further. Next, the luminous layer with a thickness of 300nm was formed with the dip coating method on the ITO transparent electrode using the 3-% of the weight dichloroethane solution which contains the compound of polycarbonate (weight average molecular weight 50000), 4, and 4' screw [ - ] [N-phenyl-N-(3''-methylphenyl) amino] biphenyl, tris (8-quinolate) aluminum, and the instantiation compound number 46 at a rate of the weight ratio 100:40:60:1, respectively. Next, after fixing to the substrate electrode holder of vacuum evaporationo equipment the glass substrate which has this luminous layer, the vacuum evaporationo tub was decompressed to  $3 \times 10^{-6}$ Torr. Furthermore, they are magnesium and silver on a luminous layer Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, it considered as cathode, and organic electroluminescence devices were produced. When the direct current voltage of 15V was impressed to the produced organic electroluminescence devices under the desiccation ambient atmosphere, it is 66 mA/cm<sup>2</sup>. The current flowed. Brightness 770 cd/m<sup>2</sup> Green luminescence was checked.

[0084] The example 22 glass substrate was cleaned ultrasonically using neutral detergent, an acetone, and ethanol. The substrate was dried using nitrogen gas and UV / ozone washing was carried out further. Next, it is the compound of the instantiation compound number 18 on a glass substrate Evaporation rate 0.2 nm/sec It vapor-deposited in thickness of 100nm. Moreover, they are magnesium and silver Evaporation rate 0.2 nm/sec Vapor codeposition (weight ratio 10:1) was carried out to the thickness of 200nm, and it considered as cathode. In addition, vacuum evaporationo was carried out, with the reduced pressure condition of a vacuum evaporationo tub maintained. Then, after sticking Scotchtape on cathode, when Scotchtape was exfoliated, the thin film of the compound of the instantiation compound number 18 also exfoliated from the glass substrate with cathode, and it became clear that the adhesion force with cathode is good.

[0085] In example of comparison 5 example 22, the thin film which vapor-deposited cathode by the approach of a publication in the example 22 was produced instead of the compound of the instantiation compound number 18 except having used Quinacridone. Then, after sticking Scotchtape on cathode, when Scotchtape was exfoliated, it exfoliated between cathode and the thin film of Quinacridone, and it became clear that the adhesion force with

cathode is poor.

[0086] In example of comparison 6 example 22, the thin film which vapor-deposited cathode by the approach of a publication in the example 22 was produced instead of the compound of the instantiation compound number 18 except having used 5 and 12-dimethyl Quinacridone. Then, after sticking Scotchtape on cathode, when Scotchtape was exfoliated, it exfoliated between cathode and the thin film of 5 and 12-dimethyl Quinacridone, and it became clear that the adhesion force with cathode is poor.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

- [Drawing 1] It is outline structural drawing of an example (A) of organic electroluminescence devices.
- [Drawing 2] It is outline structural drawing of an example (B) of organic electroluminescence devices.
- [Drawing 3] It is outline structural drawing of an example (C) of organic electroluminescence devices.
- [Drawing 4] It is outline structural drawing of an example (D) of organic electroluminescence devices.
- [Drawing 5] It is outline structural drawing of an example (E) of organic electroluminescence devices.
- [Drawing 6] It is outline structural drawing of an example (F) of organic electroluminescence devices.
- [Drawing 7] It is outline structural drawing of an example (G) of organic electroluminescence devices.
- [Drawing 8] It is outline structural drawing of an example (H) of organic electroluminescence devices.

[Description of Notations]

- 1 Substrate
- 2 Anode Plate
- 3 Hole-Injection Transporting Bed
- 3a Hole-injection transport component
- 4 Luminous Layer
- 4a Luminescence component
- 5 Electron Injection Transporting Bed
- 5" Electron injection transporting bed
- 5a Electron injection transport component
- 6 Cathode
- 7 Power Source

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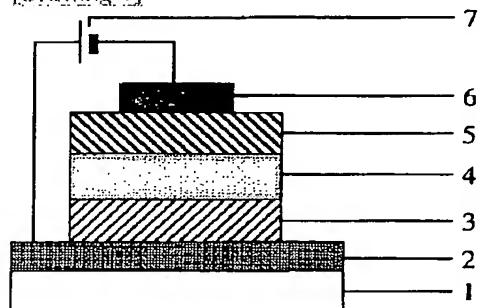
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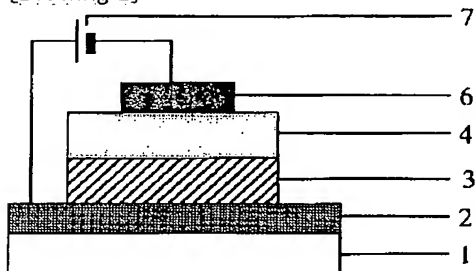
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DRAWINGS

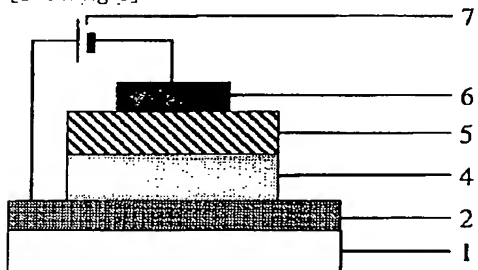
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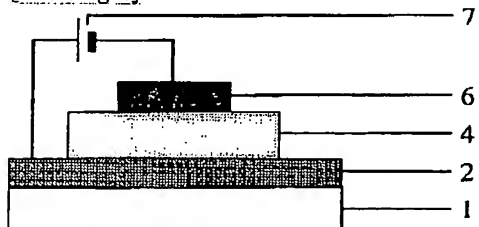
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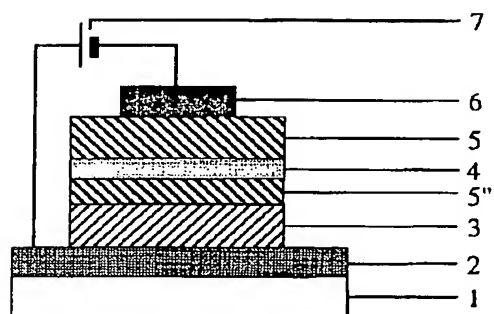
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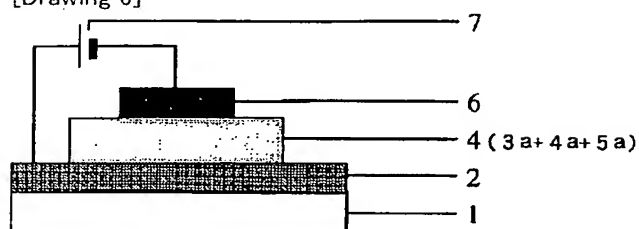
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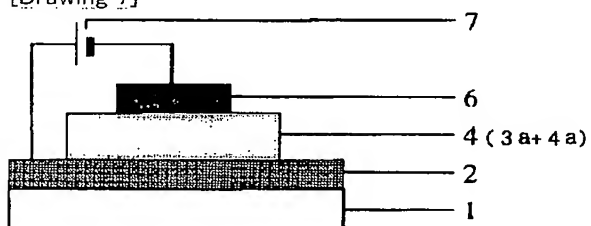
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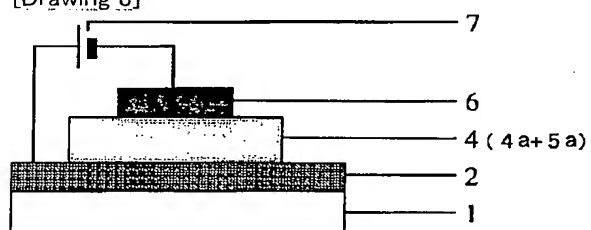
[Drawing 6]



[Drawing 7]



[Drawing 8]



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